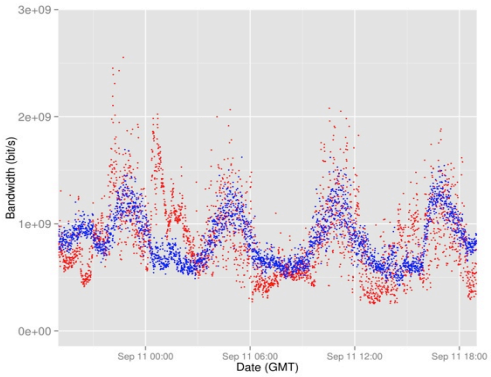
Intelligent Performance Analysis

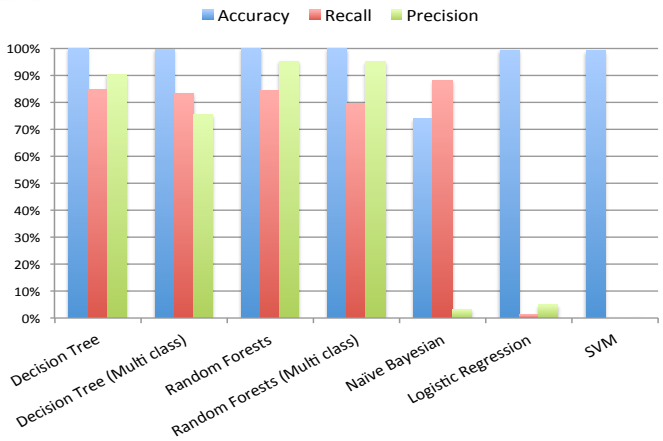
Objectives

- Develop performance analysis techniques for online streaming data.
- Develop online anomaly detection and pattern searching techniques.
- Develop deep learning techniques for performance prediction.



Network traffic performance prediction model, validated with the actual traffic measurements. Prediction error is within the variance of observed traffic measurements. Blue is the prediction and red is the observed traffic measurements.

Failure prediction results based on machine learning, 99.8% accuracy with 83.6% recall and 94.8% precision.



Progress & Accomplishments

- Developed prediction methods for network data throughput and cluster job performance
  - Machine leaning based model
  - Statistical model - Best Predictive Generalized Linear Mixed Model with Predictive Lasso (IJSP 5/2015 journal paper)
  - Time series model (ICNC'15 conf. paper)
- Developed automated performance diagnostic method and failure detection method for cluster jobs
- Developed a data reduction method based on pattern searching - U.S. Patent pending serial no. 14/555,365.
- Developing in-situ feature detection methods
- Developing online job failure prediction methods

Impacts

- Improve resource utilization and analysis workflow performance.
  - Enable predictable data throughput over the network.
  - Improve resilience of computing jobs
  - Long-term capacity and traffic engineering planning of network infrastructures
- Enable dynamic data reduction based on in-situ feature detection